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(54) **ELECTRONIC NOTE MANAGEMENT  
SYSTEM AND USER-INTERFACE**

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Sep. 7, 2004, now Pat. No. 8,880,597.

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**G06F 21/00** (2013.01)

(52) **U.S. Cl.**  
CPC ..... **G06F 21/00** (2013.01)

(58) **Field of Classification Search**  
CPC ..... **G06F 21/00**  
USPC ..... **709/205**  
See application file for complete search history.

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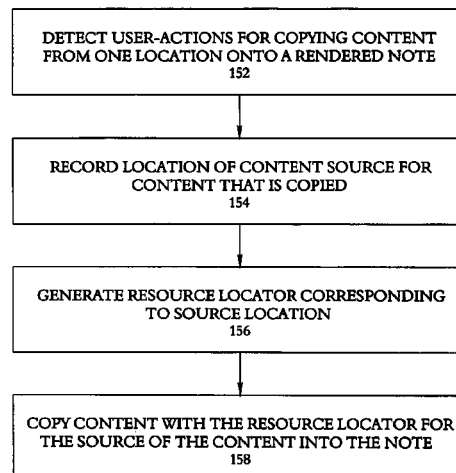
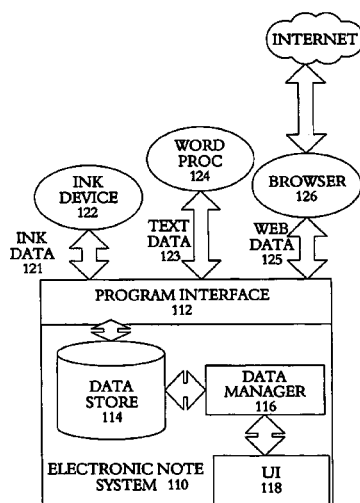
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LLC

(57) **ABSTRACT**

An electronic note management system is provides that includes a storage component, a user-interface, and one or more navigation features. The storage component maintains a plurality of records, and the user-interface component renders a plurality of electronic notes from the plurality of records. The user-interface is configured to display a given group of two or more notes in the plurality of notes as a sequenced series while the two or more notes are in a rendered state. One or more navigation features provided with the user-interface to enable a user to navigate (i) from a first note in the group to a next note in the group that is adjacent to the first note in the sequenced series (ii) while the first note and the next note are in the rendered state.

**12 Claims, 17 Drawing Sheets**



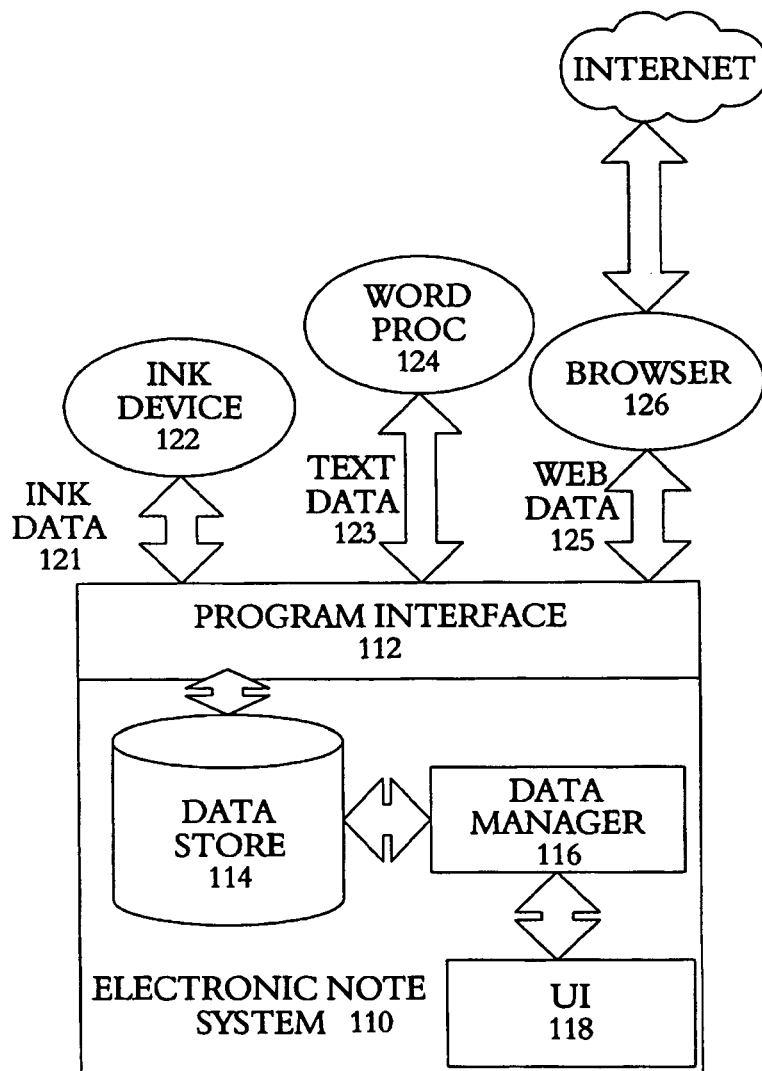


FIG. 1A

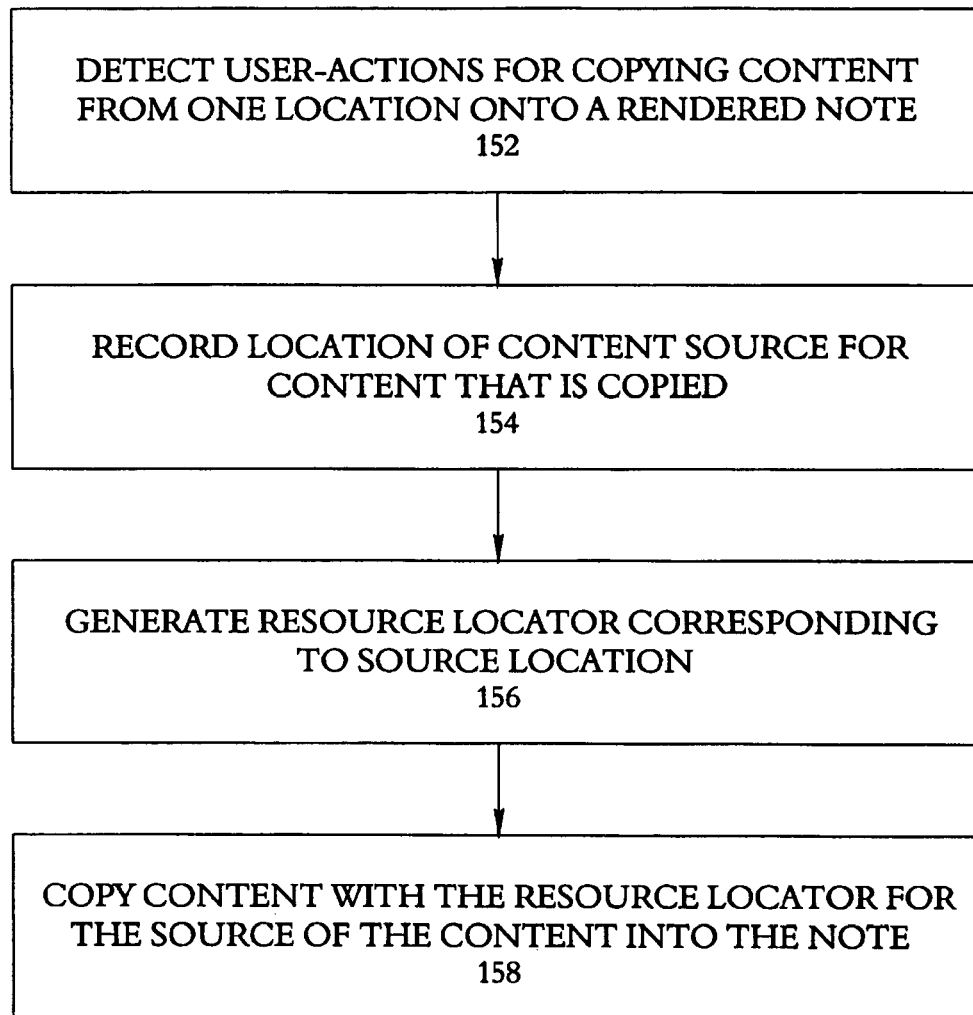


FIG. 1B

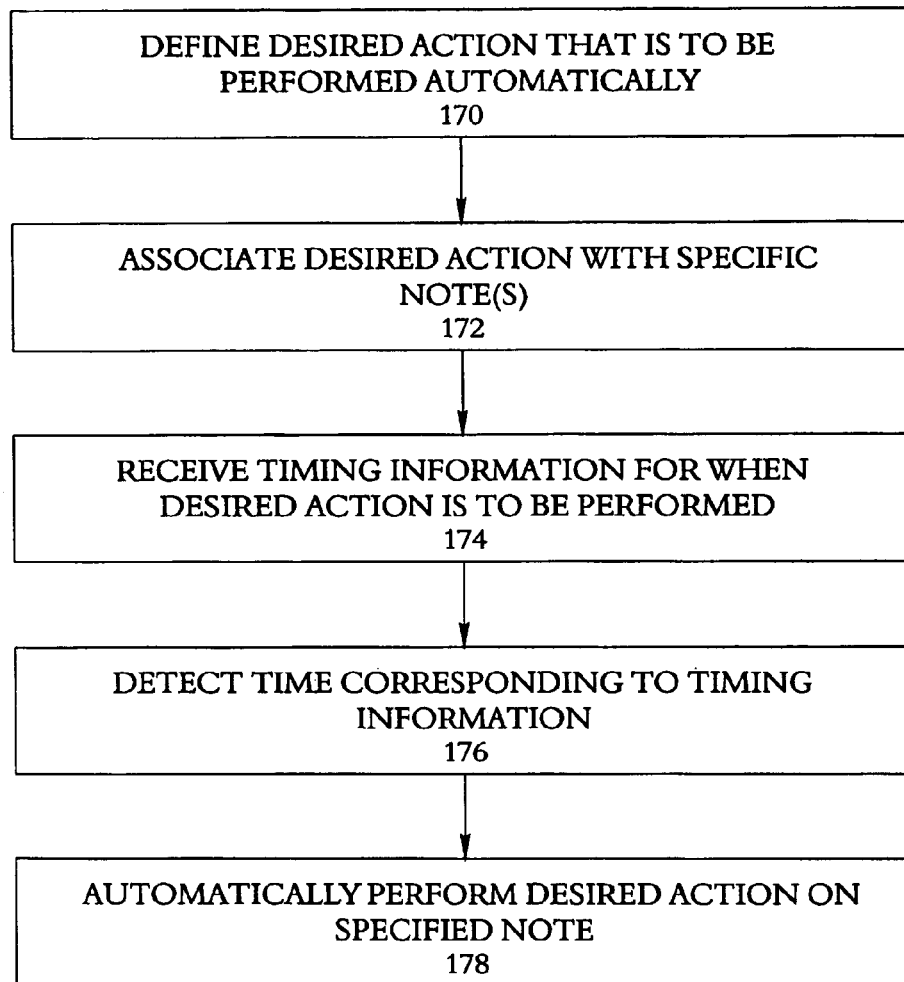


FIG. 1C

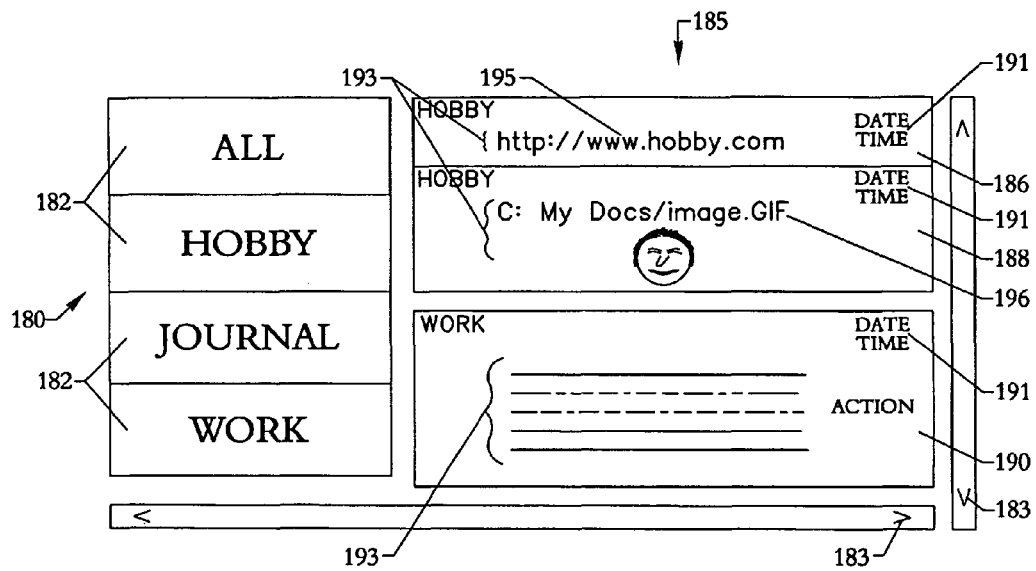


FIG. 1D

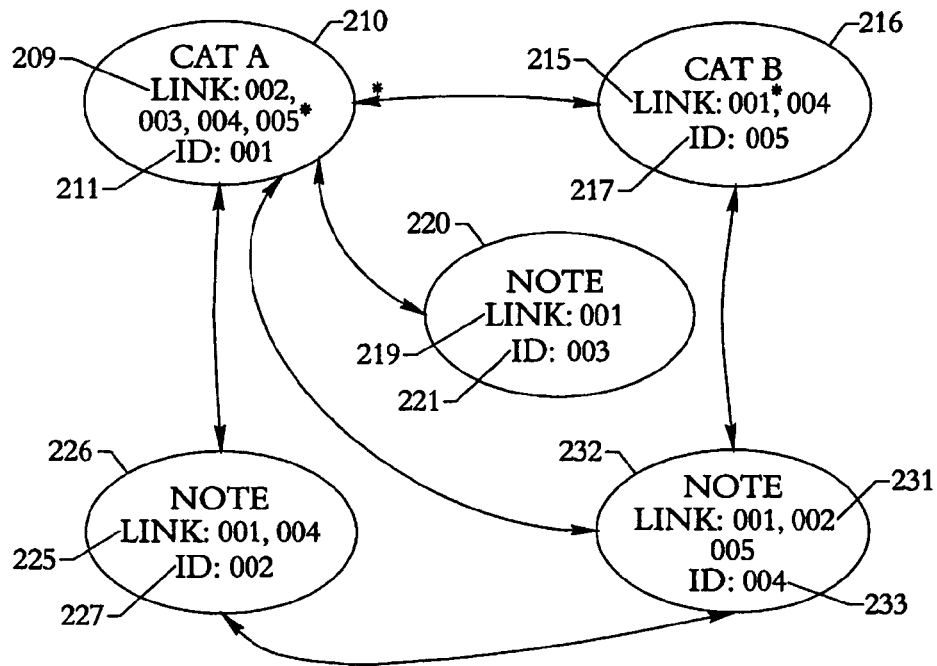
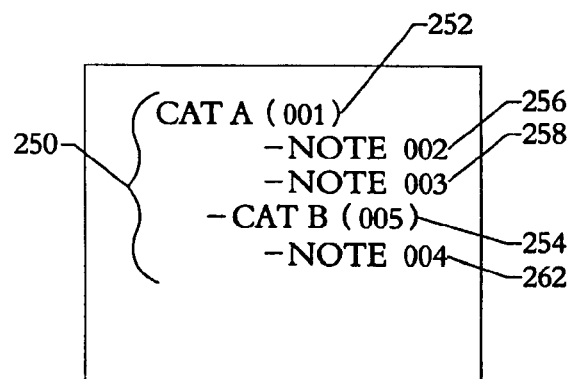


FIG. 2A



DIRECTORY VIEW

FIG. 2B

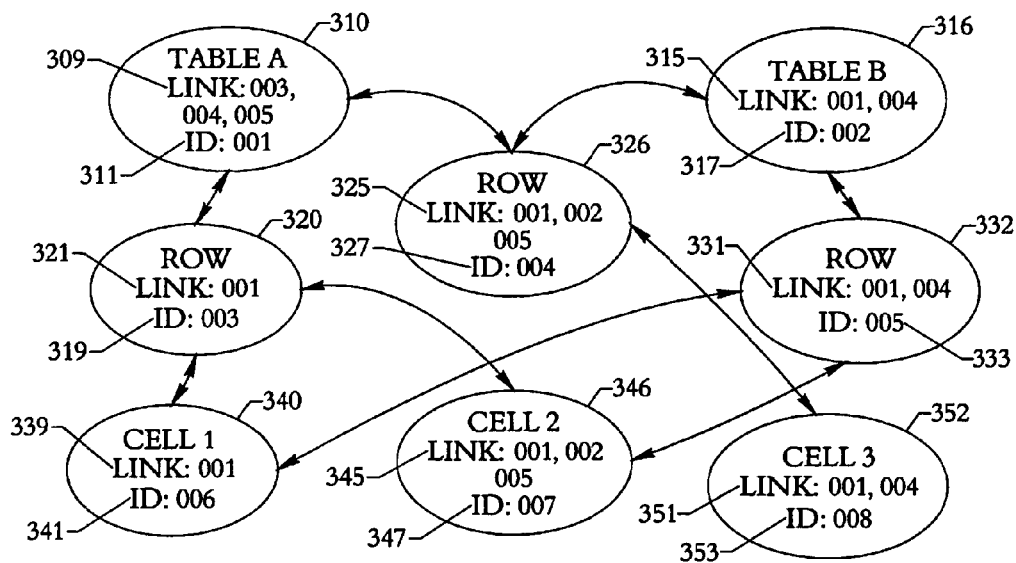


FIG. 3A

TABLE A

ROW 1	CELL 1	CELL 2
ROW 2		CELL 3

FIG. 3B

TABLE B

ROW 2		CELL 3
ROW 3	CELL 1	CELL 2

FIG. 3C

414  
0  
CATEGORIES  
CATEGORY  
SUBCATEGORY  
DATE\_CREATED  
DATE\_MODIFIED

410  
MARKETING  
5  
51, 52  
40  
2004/ 01/ 27 19:29:38  
2004/ 07/ 13 21:43:45

418

CATEGORY DATA ITEM

FIG. 4A

424  
ACTIVE\_NOTES  
CONTENT  
HISTORY  
CATEGORY  
DATE\_CREATED  
DATE\_MODIFIED

420  
2  
Note-taker Peter's website <http://www.notetakepeter.com>  
524, 604  
41  
2004/ 01/ 27 19:29:38  
2004/ 07/ 13 21:43:45

428

NOTE DATA ITEM

FIG. 4B

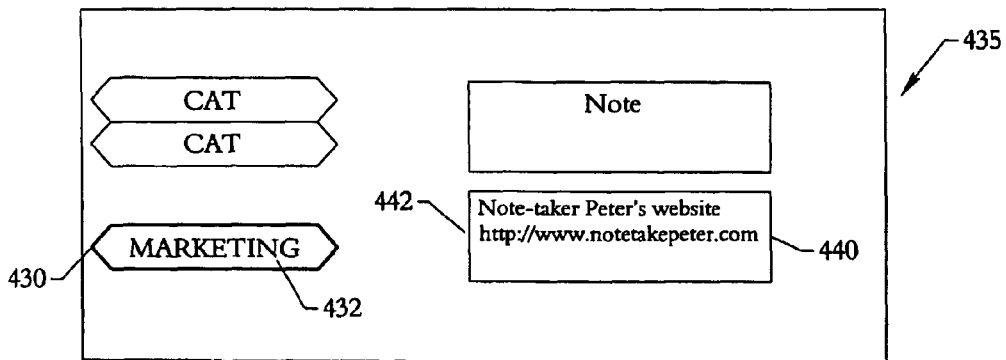


FIG. 4C



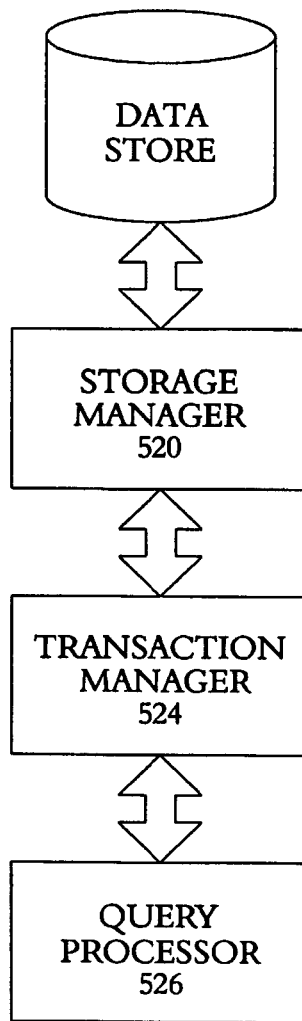


FIG. 5

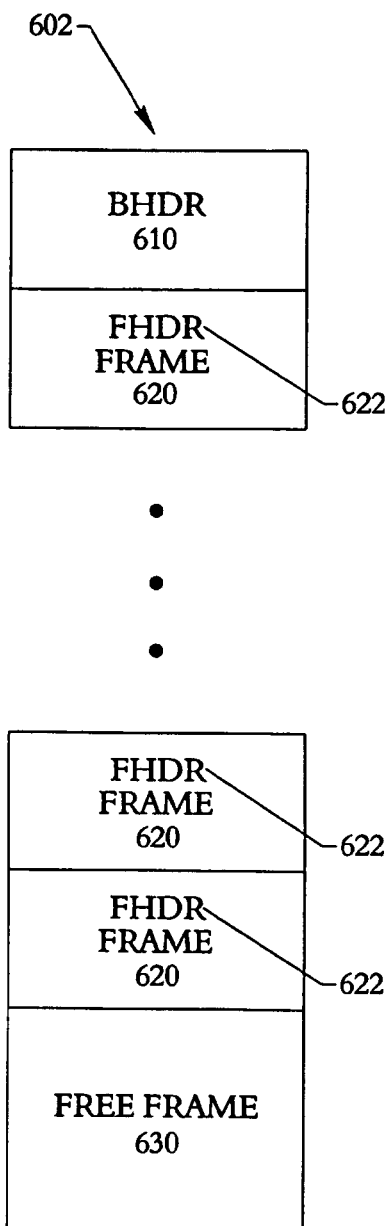


FIG. 6

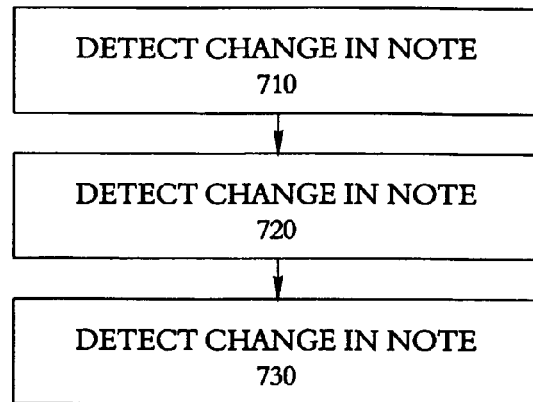


FIG. 7A

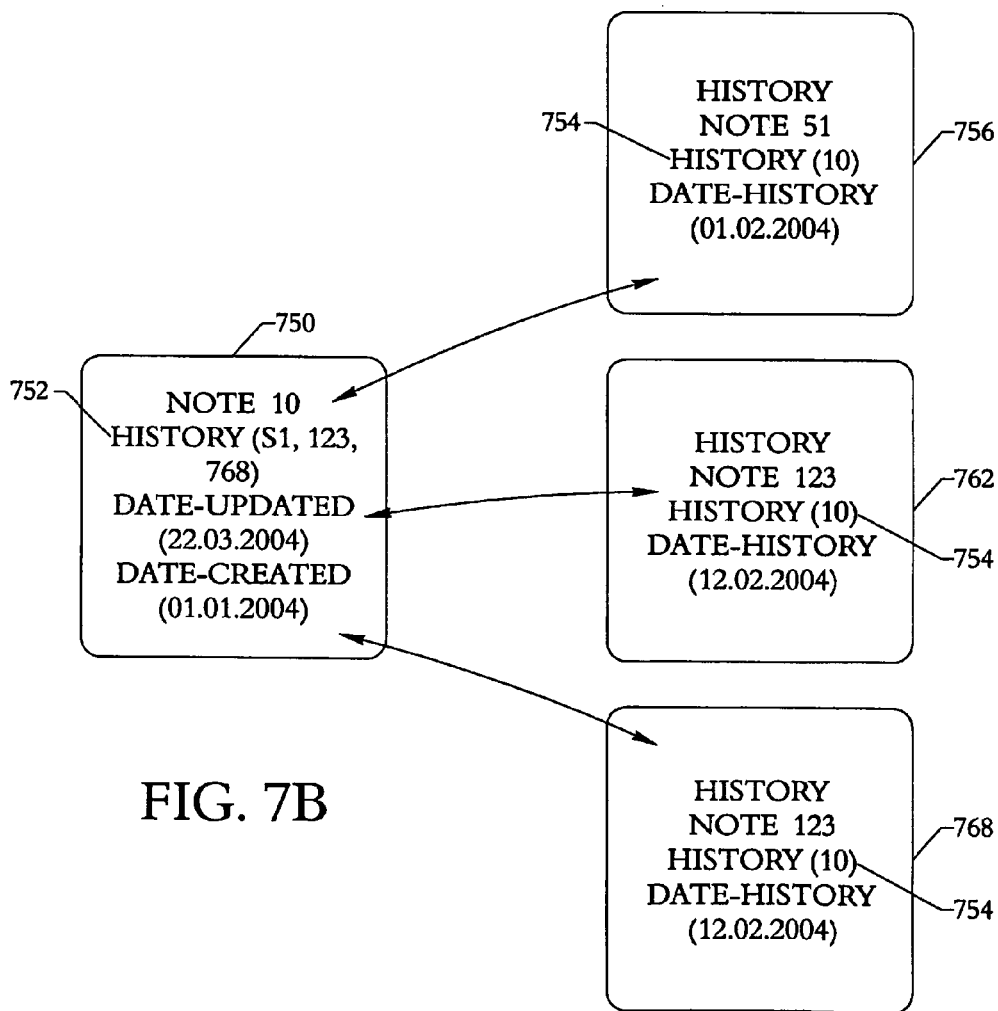


FIG. 7B

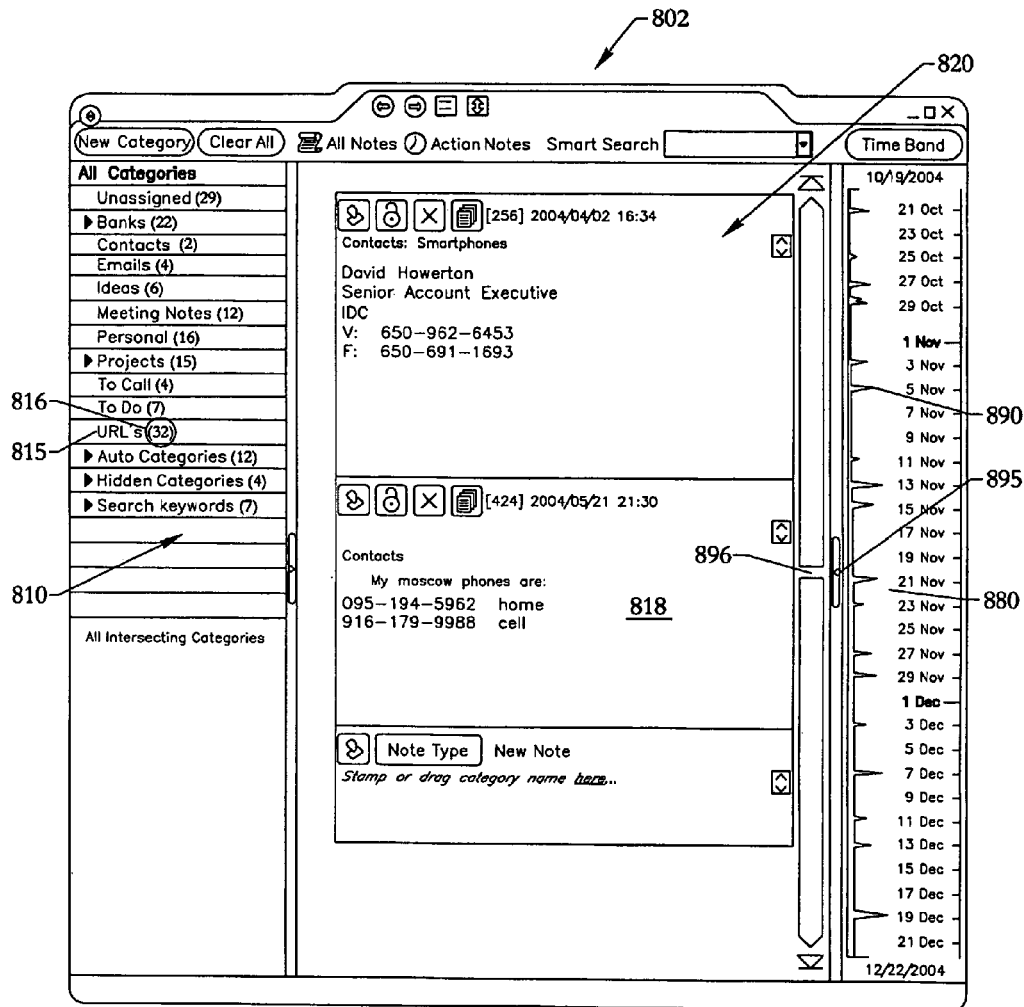


FIG. 8A

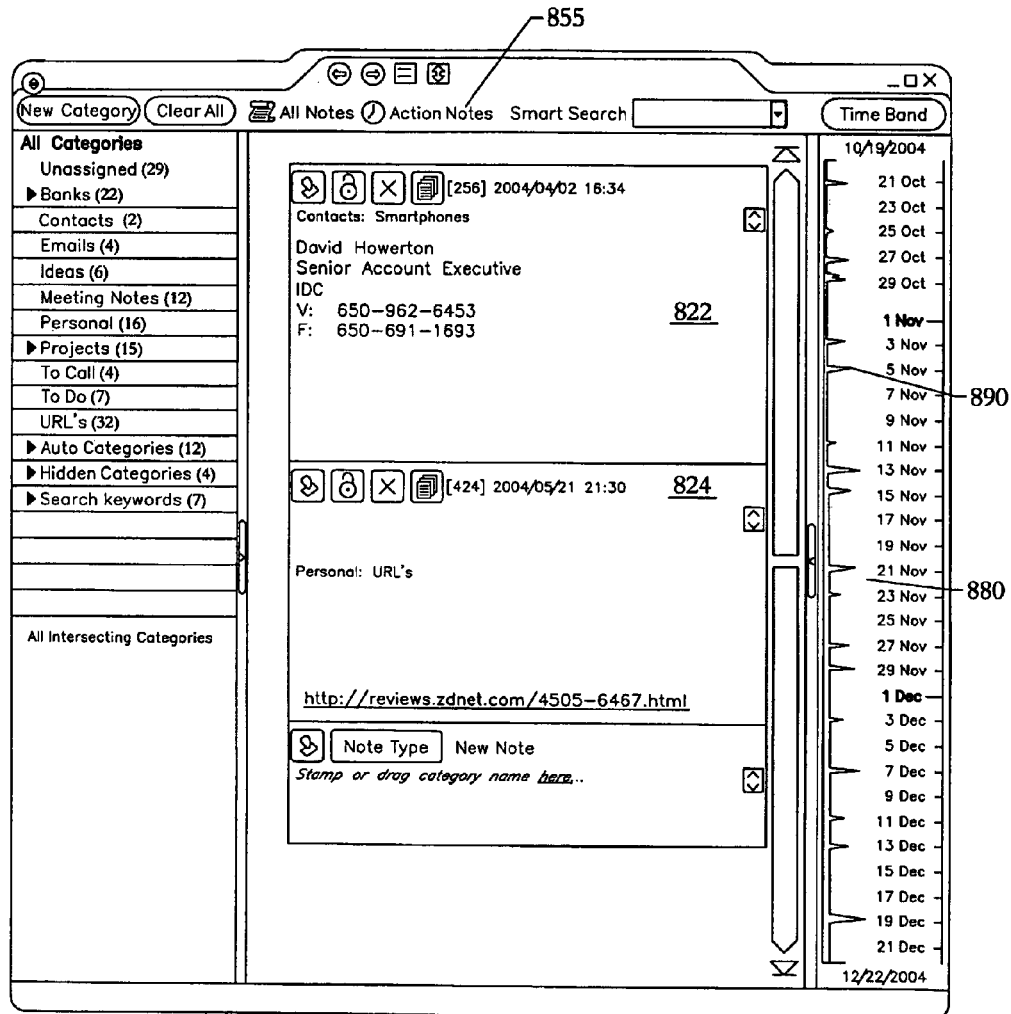


FIG. 8B

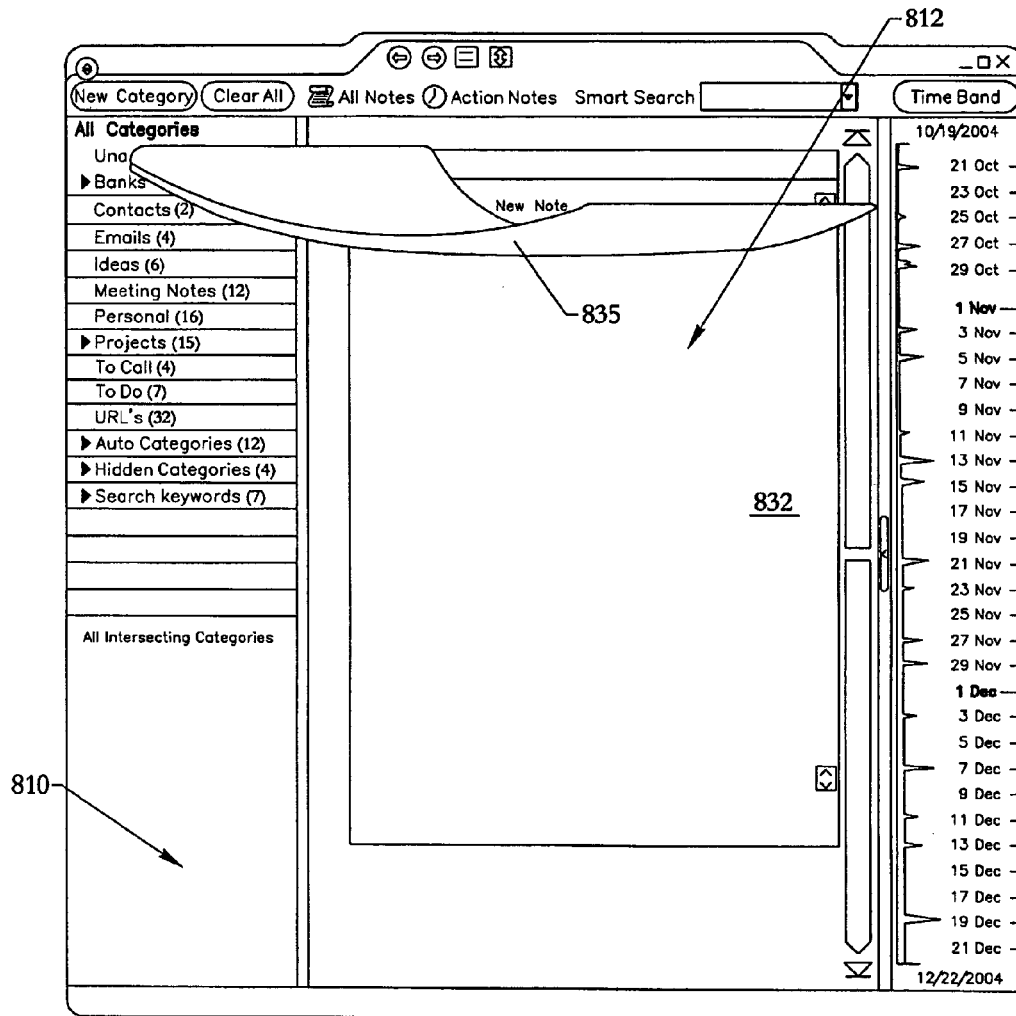


FIG. 8C

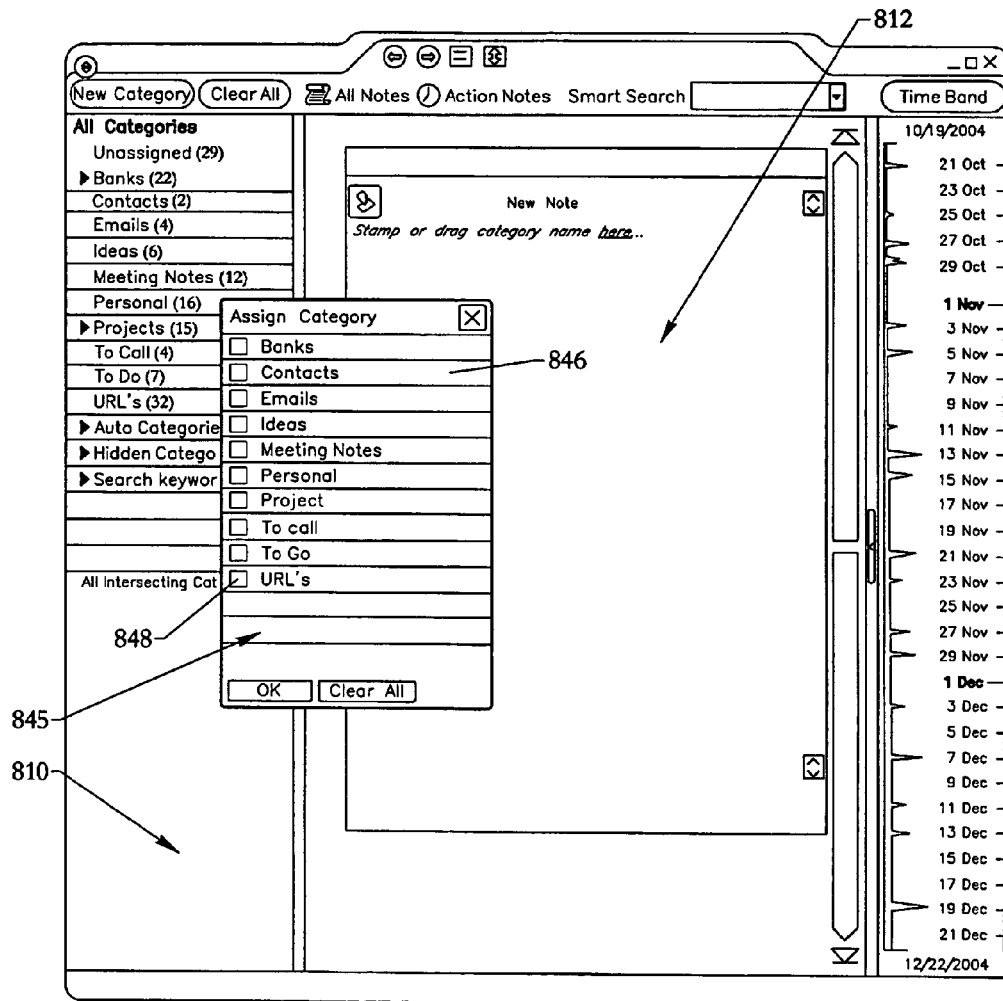


FIG. 8D

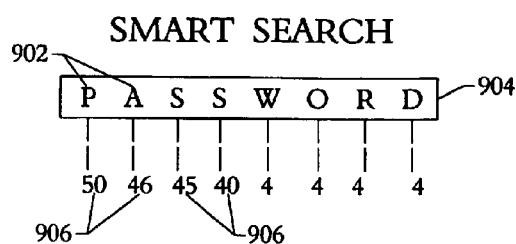


FIG. 9

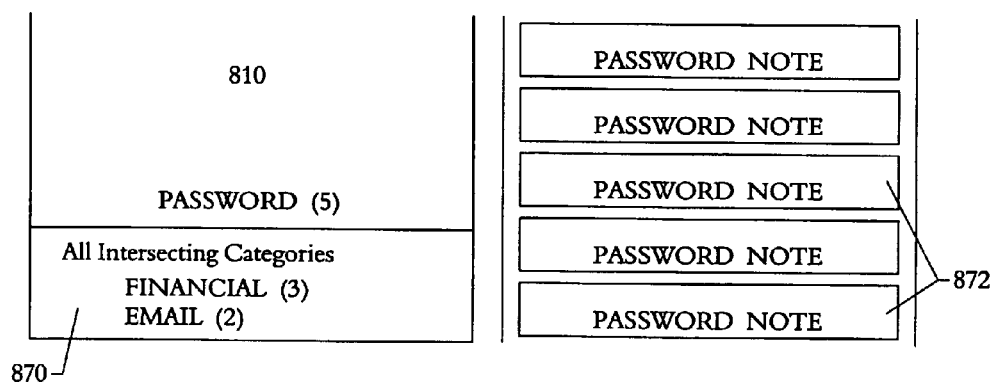


FIG. 8F



A screenshot of a software dialog box titled "Category". The dialog box has a standard window frame with a close button (X) in the top right corner. Inside the dialog, there is a label "Category name:" followed by a text input field. Below this, there is a section titled "Option:" with the text "Automatically include all notes that:". Underneath, there are two stacked text input fields. The first field contains the text "[SELECT A PROPERTY]" and the second field contains the text "[BASED ON]". At the bottom of the dialog, there are two buttons: "OK" and "Cancel".

860

Category

Category name:

862

Option:

Automatically include all notes that:

869 [SELECT A PROPERTY]

866 [BASED ON]

OK Cancel

FIG. 8E

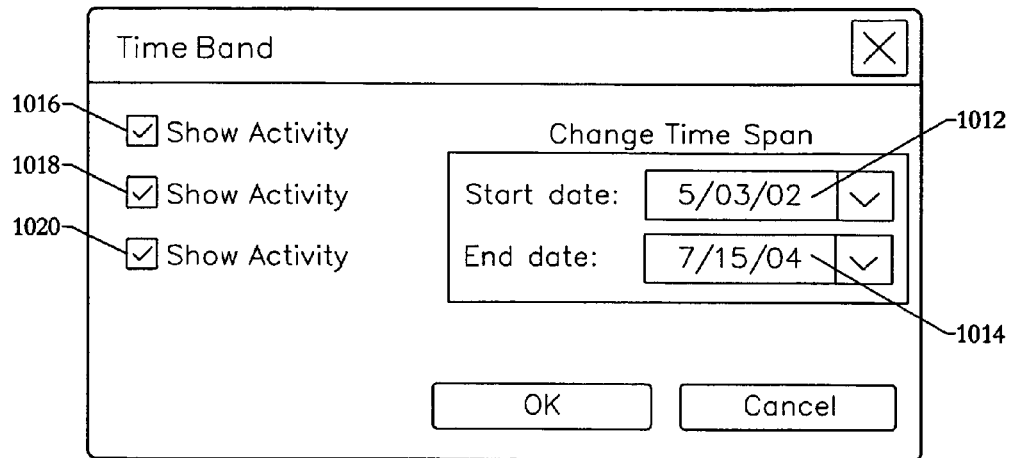


FIG. 10A

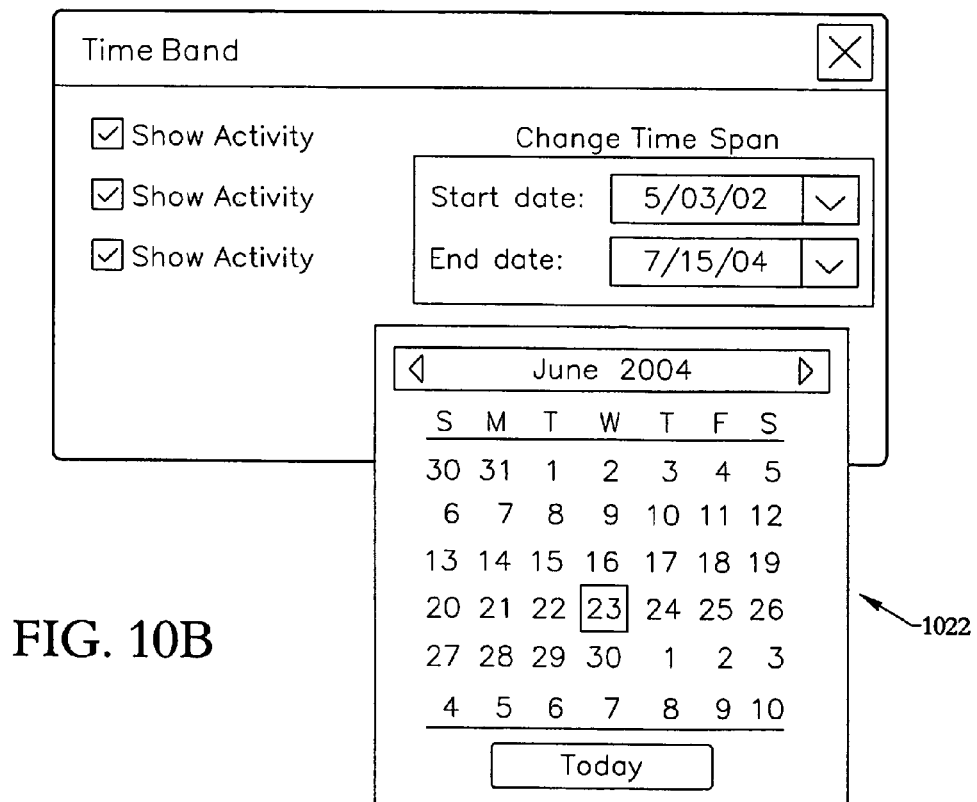


FIG. 10B

1

## ELECTRONIC NOTE MANAGEMENT SYSTEM AND USER-INTERFACE

### RELATED APPLICATIONS

This application is a continuation of U.S. application Ser. No. 10/936,193 filed Sep. 7, 2004 now U.S. Pat. No. 8,880,597, which is incorporated by reference herein.

### TECHNICAL FIELD

The disclosed embodiments relate generally to the field of electronic notes. In particular, the disclosed embodiments relate to a system and method for presenting electronic notes.

### BACKGROUND

Electronic notes have existed for several years. The APPLE NEWTON, manufactured by APPLE INC. was one of the earlier mobile devices to run a note application. Notes were presented end to end, based on user-inputted content through a stylus. Since then, note applications have progressed into other platforms. Currently, MICROSOFT OUTLOOK offers a Note application in which users can create notes, copy content into and out of notes, and color-code the notes. The PALM OS, manufactured by PALMONE INC. offers similar functionality for handheld devices. In those devices, users may set alarms for notes, so that notes provide timed notification functionality.

Note functionality has also been incorporated into other applications. Many core applications of personal information management systems carry note functionality. For example, the Contacts feature of OUTLOOK enables users to enter information about users as if the contact record were a note. The PALM OS enables users to call a note as an attachment to other records.

Electronic note programs are convenient for users to record information quickly. Many such programs do not require users to save content entered into the note, as the content is saved automatically. But most current note applications are cumbersome to use. In general, the current applications require users to open and close individual notes, and they list little information other than metadata about the note to enable the user to select a note to open. In order to locate a particular note, the user must scan through note titles, or additional metadata about the notes, and perhaps open and close several notes until they find the note sought. A search feature provided with some note applications is useful when search terms are readily known, but the search feature does not facilitate scrolling or browsing notes.

In applications such as OUTLOOK NOTES, the user can assign categories for notes. But the process of category assignment is always entirely manual, and requires right-clicking on a category, choosing the Categories command, checkmarking the category to be assigned and then clicking "OK". When notes carry very limited information (such as a single password), this process becomes very inefficient.).

### BRIEF DESCRIPTION OF THE DRAWINGS

FIG. 1A illustrate an electronic note system, under an embodiment of the invention.

FIG. 1B illustrates a method for recording the source of content that is copied into an electronic note, under an embodiment of the invention.

2

FIG. 1C illustrates a method for assigning automated tasks to be performed with specific electronic notes, under an embodiment of the invention.

FIG. 1D is a simplified illustration of a presentation that can be created using an electronic note system such as described in FIG. 1.

FIG. 2A illustrates a scheme for using self-contained data items to emulate a hierarchical data structure, under an embodiment.

FIG. 2B illustrates an example of a hierarchical data structure that can be emulated from a relationship of data items as described in FIG. 2A.

FIG. 3A illustrates a scheme for using self-contained data items to emulate one or more relational data structures, under an embodiment of the invention.

FIGS. 3B and 3C illustrate tables that can be emulated using a relationship of data items from FIG. 3A.

FIGS. 4A and 4B illustrate structures of data items, under an embodiment of the invention.

FIG. 5 illustrates a system for using data items to emulate other data structures, under an embodiment of the invention.

FIG. 6 illustrates a memory mapping file for a system such as described in FIG. 5.

FIG. 7A illustrates a method for automatically archiving a note, under an embodiment of the invention.

FIG. 7B is a block diagram illustrating how several history notes can be created in response to modifications or updates of a given note, under an embodiment of the invention.

FIGS. 8A-8F illustrate different presentations and functionalities for organizing, categorizing, and locating electronic notes, according to embodiments of the invention.

FIG. 9 illustrates a smart-search feature for use with an embodiment of the invention.

FIGS. 10A and 10B illustrate an interface for setting a time band and an activity marker for use with a user-interface as described.

### DETAILED DESCRIPTION

An electronic note system is provided that enables users to readily view, organize and locate electronic notes. More specifically, embodiments of the invention provide numerous functions and interfaces in which users may categorize, filter, search and navigate electronic notes.

#### Overview

Embodiments of the invention include an electronic note management system comprising a storage component, a data manager and a user-interface component. The storage component maintains a plurality of records. The data manager and the user-interface component combine to render a plurality of electronic notes from the plurality of records. The data manager and the user-interface component combine to arrange a given group of two or more notes in the plurality of notes as a sequenced series while the two or more notes are in a rendered state. One or more navigation features may be provided with the user interface to enable a user to navigate (i) from a first note in the group to a next note in the group that is adjacent to the first note in the sequenced series (ii) while the first note and the next note are in the rendered state. Additionally, each of the plurality of records includes data for rendering a content body on one or more notes that are rendered from that record. The data for rendering the content body for each of the plurality of notes may be of one or more data types.

In one embodiment, the data for rendering the content body for each of the plurality of notes may be of a type for rendering

an image, a text output (including a rich text output), a markup language content, electronic ink output, or even an audio output.

An output of an embodiment such as described may correspond to a presentation where multiple notes are sequenced on one panel or display area. A navigation feature enables a user to scroll from one note to another note in a seamless manner. It is also possible for the scrolling to enable one note to be more prominently displayed than another note, while both notes are concurrently displayed in the same panel or display area. Additionally, notes displayed in the panel or display area may include content of different types. For example, a user may scroll from one note in a sequence that displays an image to another note in the sequence that displays text, or a combination of text and image. The electronic note system then enables the presentation of notes to be a hub where user-selected content can be stored and retrieved for quick access. The ability of the user to seamlessly navigate from one note to another note on the same presentation further enhanced the user's ability to view the content and quickly retrieve selected content when desired.

Embodiments of the invention include features to enable users to organize and rapidly locate specific notes. Specifically, the user can organize and locate specific notes without knowing exactly where an individual note is provided in the presentation, or even what is contained in the note. Organization features include the ability to automatically categorize notes, or for users to manually categorize notes, and to render notes using category filters. The category filters may be simple or more complex. For example, the user may filter notes based on a single category or based on two categories. In the latter case, the filter may produce notes that are in both categories. Alternatively, based on user-preference or selection, the two category filter may yield all notes that are in one or both categories.

Furthermore, the ability to locate notes may be enhanced by a search feature. In one embodiment, the search feature compares a search criterion with the content bodies of notes to identify notes that match the criterion. Other examples of features that facilitate the location of notes includes a time band (e.g. a calendar based time band) and a histogram that reflects how many notes were created and/or modified on a given date.

A note is an item having content that is rendered by an application. A note may be rendered from a record. When rendered, a note may automatically save any change (including creation, modification or deletion) to the note's content in response to any input event that causes such content changes to occur. Examples of input events include alphanumeric entry from a keyboard; a gesture made through use of a gesture input device (digital pen, stylus, WRITE ANYWHERE (manufactured by the MICROSOFT CORPORATION) pointer); electronic text and document selection, copying and pasting; a click and drag of a displayed object through an on-screen pointer; or automatic import of digital camera and camera phone snapshots. Other attributes or characteristics of a note may include (i) a limit as to its size, (ii) a medium to provide access or view of other content while maintaining a size that is small relative to those other sources of content.

The act of scrolling means that one or more given content items progressively move from one location to another location on a display area.

Ink data refers to image data that replicates a user's gesture or stroke, as made through a user-controlled object, such as a finger, stylus, electronic pen, and mouse/pointer continuous movement. For example, the finger or stylus may be moved

over a detection pad, or a touch-sensitive display. As another example, a pointer can be moved to replicate a cursive handwriting stroke (e.g. as provided in the WRITE ANYWHERE application).

Embodiments described herein are not platform or device specific, and may be implemented through the use of executable instructions that can be stored and/or used in any computer-readable medium. One or more embodiments described herein may be implemented through the use of instructions that are executable by one or more processors. Methodologies, systems, and components described in this application provide examples of processing resources and computer-readable mediums on which instructions for implementing embodiments of the invention can be carried and/or executed. In particular, the numerous machines shown with embodiments of the invention include processor(s) and various forms of memory for holding data and instructions. Examples of computer-readable mediums include permanent memory storage devices, such as hard drives on personal computers or servers. Other examples of computer storage mediums include portable storage units, such as CD or DVD units, flash memory (such as carried on many cell phones and PDAs), and magnetic memory. A computer-readable medium as used herein may extend across multiple machines. For example, the medium may be distributed between client and server in order to perform a stated task or operation.

#### Electronic Note System

FIG. 1A illustrates an electronic note system, according to an embodiment of the invention. Elements of an electronic note system 110 include an application program interface (API) 112, a data store 114, a data manager 116, and a user-interface (UI) 118. Each component described in FIG. 1 may be provided as a module. In one embodiment, the electronic note system 110 may exist in the form of a client side application. For example, the electronic note system 110 may reside on a desktop computer of the user. In another embodiment, the electronic note system 110 may include a network side service. For example, the electronic note system 110 may be accessible to the user, along with numerous others, over the Internet. Still further, the electronic note system 110 may exist as a service having components/modules that reside on both the client and the server. For example, UI 118 may exist on a client terminal (or shared between client and server), while the data manager 116 and data store 114 reside on a server. Alternatively, a portion of the data server 114 (such as the archive copy) may exist on the server. Numerous other variations are possible as well. As will be described, the electronic note system 110 may be used to produce a presentation of electronic notes, organized by date, subject, category or other criteria. Each note may be based on individual records maintained in the data store 114.

In one embodiment, the data store 114 is a relational data structure, such as a database in which one or more tables are maintained. In another embodiment, the data store 114 stores data items that emulate relational data structures. Additional description of such an embodiment is provided below. The data manager 116 may access records from the data store 114 and present the records through UI 118. Numerous actions, operations and uses for notes may be performed or implemented through the use of the data store 114 combined with the data manager 116. In addition, the UI 118 provides a mechanism by which a user may enter input and otherwise interface with the electronic note system 110. The UI 118 may include one or more skins to facilitate the graphic display of the presentation of notes.

In one embodiment, the API 112 includes one or more applications that are capable of interfacing with multiple

types of applications and/or devices so that individual notes can include content of different types. In one embodiment, the API 112 includes a routine or program for every application or device that interfaces with the electronic note system 110. For example, one presentation of electronic notes may include individual notes that have the following content: image (e.g. JPEG, GIF or PDF), text, ink, web-based (e.g. HTML), audio and video. In an example provided by FIG. 1A, the electronic note system 110 may be capable of interfacing with an ink device 122 in order to receive and carry “ink data” 121. Ink data 121 may correspond to gestures, strokes, stylus/pen movements, and/or pointer movements from handwriting devices and/or pointers (including software based pointers). The ink data 121 may be rendered to present gestures or handwritten notes in a content body of a note. The electronic note system 110 may also be capable of interfacing with a word processing application 124 to receive and carry text data 123 in its content. The browser 126 may interface with electronic note system 110 to provide markup language data 125 from sites on the Internet or other network. The browser 126 may also provide other forms of data, including image data (e.g. JPEG or GIF format, or PDF data produced by ADOBE (manufactured by ADOBE, SYSTEMS, INC)) and text data. Thus, the content body of each note provided by the electronic note system 110 may carry and render data corresponding to ink data, text data, image data, web-based data. The content body of each note may also carry video and/or audio data.

In addition, the API 112 may be configured to import data from (or export data to) to other organization applications, including for example, MICROSOFT OUTLOOK (manufactured by the MICROSOFT CORPORATION) and PALM DESKTOP (manufactured by PALMONE INC.). In addition, the electronic note system 110 may interface with numerous other types of devices and applications in order to provide or access different kinds of data. As an example, an interface may be provided to an audio input device, such as a microphone, so that a note can be used to access recorded audio information. The interfaces may allow notes to be imported and exported amongst different machines and devices, including amongst devices having different operating systems and/or platforms (e.g. between desktop computer and smart phone).

Notes provided by the electronic note system 110 may display or otherwise render content of different data types from numerous different sources. However, embodiments of the invention also allow notes to carry locator links to content. For content such as image data, notes may carry thumbnail views of images. In either case, the locator links and thumbnails are selectable to access a specific document or file.

As will be described, the data manager 116 and UI 118 may combine to provide notes in a categorized manner. Multiple notes may be provided at one time. Furthermore, in an embodiment, notes are sequenced, and multiple notes may be rendered at once based on category and sequence. Each note may carry content of a particular type (e.g. image, text, web-based), regardless of what other adjacent and rendered notes are displaying in the presentation provided by the electronic note system 110. Each note may also carry a combination of data types, such as for example, a combination of text and image, ink and text, or audio and text.

An embodiment provides that an electronic note system 110 such as described may be extended to multiple devices, machines and resources of the user. For example, the user may share the electronic note system between one or more of the following: (i) desktop computer for work, (ii) desktop computer for home, (iii) smart phone (e.g. a cell phone with

organizational applications and email capabilities), (iv) personal digital assistant (PDA), and (v) an Internet account. The Internet account may require the user to enter a user log in and password in order to view that user's collection of electronic notes, similar to many Internet email applications. In fact, the electronic note system 110 may be integrated with an Internet email account, as well as with a local email application on a desktop or other device. If more than one device or resource is used to carry records from the electronic note system 110, a synchronization feature may be provided using one of the many synchronization protocols available. For example, one embodiment may compare individual notes that correspond to one another in order to see which note was most recently updated, then overwrite the note that was older. Alternatively, notes from one system may overwrite all other notes on another system (e.g. desktop device overwrites cell phone records) with each synchronization. A synchronization operation may be performed over numerous connection mediums, including serial port or local connections, network connections, and wireless (e.g. Bluetooth and WIFI) connections.

#### Features and Functionality of Electronic Note System

FIG. 1B illustrates a method in which the source of content carried by a note may be recorded on the note itself. For example, a note may carry a portion, summary or thumbnail of a desired content in its content body. An embodiment such as described in FIG. 1B enables the same note to carry or embed a data element that is selectable to locate the source of the content in the body of the note, regardless of whether the source of the content is local, on a closed network, and/or available over a public network such as the Internet, so that all of the original content from which the content of the note was captured is rendered or made available to the user. Reference is made to elements of FIG. 1A, for purpose of providing suitable components that can perform one or more steps described.

Step 152, electronic note system 110 detects one or more designated actions that the user performs in order to initiate/cause content to be copied and/or moved from a source to a note. The source may include a document, such as a text document (e.g. WORD file), an image file, or HTML page. The source may be located locally, on a connected computer (such as through a direct connection, a local area network or other network connection) or on a website. The one or more actions may be designated actions that trigger the electronic note system 110 into performing a method of FIG. 1B. In one embodiment, an item corresponding to a file, document, or selected portion thereof are copied onto the clipboard of the operating system on which the electronic note system 110 operates. As an additional or alternative embodiment, the action(s) that trigger the electronic note system include detecting that content is being “dragged” or otherwise actively moved from one location to a rendered note. A dragging operation may be performed through the operation of a pointer mechanism, such as a mouse. As an example, the triggering events may include the opening of a software window where the content source is rendered, the copying of content in that window, and the pasting of the content onto a rendered electronic note.

Alternatively, an embodiment provides that the actions of the user may be performed with or through the UI 118. For example, UI 118 may include a feature that can be actuated in order to initiate performance of a method such as described in FIG. 1B. For example, the user may click an icon that signals the data manager 116 (or some other component) to record the source of a content that is to be copied.

In step **154**, the source location of the copied content is recorded by the electronic note system. This may occur at time when the one or more actions are first initiated. In one embodiment, the source location of the content is identified using metadata that is generated by the operating system of the terminal on which the electronic note system **110** is provided, in response to a copy content operation. For example, with MICROSOFT WINDOWS operating system, the clipboard records the metadata. The electronic note system **110** may retrieve this metadata from the clipboard in this step. In an embodiment where the user actuates a feature on the UI **118** to record the source of content, a program or script of the electronic note system **110** may be executed to record the source location of the content that is subsequently copied.

In step **156**, a resource locator for locating the source of the content is generated based on recorded data corresponding to the source of the copied content. For example, a uniform resource locator (URL) or similar form of link may be generated by data manager **116** to correspond to the location of the source content recorded in step **154**. In one embodiment, the data corresponding to the source of the copied content is metadata provided on the clipboard of the operating system. Thus, a URL or other locator to the source of the content may be generated from metadata carried in the clipboard.

Step **158** provides that the URL or resource locator along with the copied content are copied into a content body of an electronic note. In one application, the URL or resource locator may be embedded in a designated portion of the note. Subsequently, the user may select the locator in order to access the document. For example, if the locator is for a WORD file stored locally, the WORD application and file may be opened. If the locator is for a content on a website, the browser may be launched with selection of the locator. The locator may then be signaled to the browser so that the browser can access and load a web page corresponding to the source of the content item. For example, the note can be displayed through UI **118**, with a selectable URL to the source of the content.

In an embodiment, one or more steps recited in a method such as described in FIG. 1B may be performed automatically by components of the electronic note system **110**. For example, once the source of content that is to be copied is identified in step **152**, the step of identifying the location of the source (step **154**) and the step of generating the resource locator (step **156**) may be performed automatically. While the step of copying the content into the note may be performed with some manual action by the user, the portion of the step corresponding to copying the resource locator of the source content may also be performed automatically.

Alternatively, an embodiment provides that features from UI **118** are made persistent or otherwise extended to other embodiments for purpose of invoking functionality and operations from the electronic note system **110**. In one embodiment, an icon may be provided on a toolbar or other region of an open application, in combination with an open document or item. Selection of the icon by the user may trigger the electronic note system **110** to copy content from the open application document to a new note. In addition to importing data from the application into a new note (or alternatively causing the other application to export data into the new note), actuation of the icon may cause the electronic note system to record and/or generate a resource locator of that document in the same note.

#### Action Notes

According to an embodiment, the electronic note system **110** may schedule, manage and perform one or more actions automatically with individually designated notes or sets of

notes. In one embodiment, individual actions are associated with select notes, and the actions are performed automatically.

Step **170** provides that a desired action is defined and/or selected. One example of a desired action includes a message action, where a note is sent as an attachment of an email, or a note's content body used to generate a message body. A message action may also be extended to other forms of messaging including instant-messaging. Other examples of desired actions include an action to delete a specific note. For example, a user may wish to avoid note clutter by setting certain notes to delete after 24 hours. Other exemplary actions include using a note as an alarm, and launching another application for use with a specific note.

Step **172** provides that the desired action is associated with a specific note. For example, the user may select the action (email a note as an attachment) and then select a note. One embodiment provides that the selections for performing this step are performed by the user through the use of UI **118**. For example, UI **118** may include features corresponding to pre-programmed scripts that can be executed on selected notes. Alternatively, an interface may be provided for the user to create his own script for performing a defined action. Still further, a wizard or programmatic assistant may be provided to facilitate the user in creating and defining scripts for performing automated actions using specified notes.

Step **174** provides that timing information is received for when the desired action is to be performed using the specified time. The user may specify or indicate a time in which the desired action is to be performed on the specific note. For example, a calendar or other timing mechanism may be provided to the user through the UI **118** to enable the user to select one or more times for the action to occur. The calendar may be provided as part of a wizard or prompt when the user defines the desired action. To provide a specific example, the user may select that a note, or its content body, or even a link to the source of the content for the body, to be sent via email to a designated user at 8:00 AM of a particular business day.

In step **176**, a time corresponding to the timing information is detected by the electronic note system. At that time, the action is triggered and the desired action is carried out using the specified note.

Specific desired actions contemplated under embodiments of the invention include the following: sending emails based on information in note items; deleting notes at specified times; retrieving content from a desired network site at a desired time and then copying that content onto a note; password-protecting a note after a certain period of time has elapsed; and retrieving emails and copying the contents of the emails into selected notes. Once the user specifies the desired action, the timing information and the specified note, the subsequent action may be performed automatically. It is also possible to have the actions performed automatically through one of the interfaces, without applying a note. For example, in one embodiment, a user may configure the electronic note system **110** to interface with and send an electronic message through an email application.

#### Note Presentation

FIG. 1D illustrates a simplified note presentation, according to an embodiment of the invention. A presentation **180** shown in FIG. 1D is an interface having functionality described in embodiments of FIGS. 1A-1C. In one embodiment, the presentation **180** may be provided through the UI **118**. The presentation **180** includes a plurality of categories features **182**. In the example provided, the category features are provided the following names: ALL, HOBBY, JOURNAL and WORK. A plurality of notes **186**, **188**, **190** are

displayed concurrently, in a panel **185** that is adjacent to the category features **182**. Each category feature **182** corresponds to a category for the notes. Each note **186**, **188**, **190** may belong to one or more corresponding categories, so that selection of a particular category feature **182** causes at least some (if any) notes associated with that category to be displayed in the panel **185**. In the example provided, notes **186**, **188** from a hobby category are displayed, and note **190** for a work category are displayed.

The notes that appear in the panel **185** may be at least partially sequenced. For example, multiple notes in one category may be sequenced to appear in a particular order when that category is selected. In the example shown, the notes are sequenced in a top-down orientation to simulate an endless tape presentation, as described in later embodiments. Furthermore, if there is space on panel **185**, notes from different categories may be displayed at the same time on the panel **185**. One or more navigation features **183** may be provided with the presentation **180** in order to enable the user to scroll or otherwise navigate displayed notes **186**, **188**, **190** and/or category features **182**.

In an embodiment, the note items each include a content body where content is displayed on the respective note. In addition, each note may include one or more of the following: a category identification (e.g. "Hobby" is identified for note items **186** and **188**), and a time stamp **191** indicating either one or both of when the note was created and/or modified. The panel **185** may simultaneously display notes **186**, **188**, and **190**, each carrying content of a different data type in the content body **193**. The content body **193** for note **186** is shown as a markup language data type, including a live website link **195** that when selected, triggers the web browser to retrieve a corresponding web page. The note **188** includes image content (e.g. GIF) in its content body **193**. Also included in its content body is a local link **196** to a source (e.g. hard drive file) where the full image may be found. The website link **195** and the local link **196** may be recorded in the respective notes **186**, **188** through a method such as described in FIG. **1B**. The note **190** may include text data in its content body **193**. The text data may be a summary or portion of a larger word processing application document. In the example provided, an action is identified in the note **190**. This action may be a pre-programmed or an automated action, implemented through use of a method such as described in FIG. **1C**.

While an embodiment shown by FIG. **1D** incorporates features and functionality described in FIGS. **1A-1C**, it should be noted that not all features shown in FIG. **1D** need be present in the output of electronic note system **110**. Different variations and combinations are contemplated. Further functional elements and details are also described below.

#### Data Management System

Embodiments of the invention provide for the creation and use of self-contained data items that can be independently arranged or assimilated into traditional forms of data structures. For example, self-contained and independent data items may be aggregated to emulate tables, flat files and directories. The data items are self-contained, because each data item is accessible and operable by itself, independent of other data items, data structures (e.g. tables), or rules that control access to data in such data structures. Data items may be individually aggregated and structured through implementation of links between data items. As will be described, a combination of linked data items, when considered as a whole, may define or represent a traditional data structure, such as a database. Moreover, because each data item is self-contained and independent, the same data item may form an element of another data structure, without a copy of the

data item being used. Thus, it is possible for one single data item to be used for two separate representations of traditional data structures. For example, one data item may be a cell in two completely different "rows" of two different tables emulated from an aggregate of the data items.

Embodiments such as described compare favorably to the traditional database approach for numerous reasons. A traditional database employs a rigid data structure of tables having rows, and individual cells of a table cannot be accessed without reading an entire row. For example, an operation performed for one cell in a table is typically performed for an entire row of the table, and entire rows are copied to perform simple operations on data of individual cells. The result is that traditional databases require significant processing resources and memory, making such databases impractical for small computing devices, such as smart cell phones.

In contrast, embodiments described herein enable such traditional data structures to be simulated, so that the end user or application follows all the rules of the data structure in operating and using data items. At the same time, data items may be shared amongst multiple data structures without need for those data items to be copied, and the same data items may be individually accessed without need for the application or end user to access other data items (such as in the database example, where an entire row is accessed to retrieve one cell).

In an embodiment, the data items may be individually associated with each other so that the items can be queried or used in the exact same manner as a traditional database. But in fact, the items are not contained in designated rows or columns, but rather are individually associated with the equivalent of multiple rows and tables. Furthermore, the items may be used to simulate more than one type of data structure simultaneously, such as for example, multiple tables and/or directories.

According to an embodiment, a data item is defined to include the following: a global unique identification (GUID), a local unique identification (UID), and one or more attributes. Attributes correspond to named entities of one of the predefined types: link, text, integer, date and BLOB (Binary Large Object). There can be more than one attribute with the same name and type stored in a single item. Item attributes such as provided by embodiments of the application may be considered to be similar to table row fields in traditional databases; however, data items do not necessarily have the same set of attributes as have table rows.

The GUID of a data item identifies that item from any other data item in the universe. Thus, the GUID may be used to identify a particular item when an item is exported from one computer to another computer. In one embodiment, the GUID corresponds to a 128-bit data value that is based on a time-stamp and a device/card identifier. The GUID may be a persistent feature of any data item. The UID may identify a data item locally. In one implementation, each UID is a persistent and sequential assignment that references an individual data item to a pointer in memory where the data item is located. At a minimum, one embodiment provides that the UIDs of all data items in a particular data store are valid between an opening and closing of the database. Furthermore, the UIDs may be persistent while the application of the data store being opened and closed, so that in most cases, the UIDs can be carried over from one session to the next.

In one embodiment, the text attribute is used to store text strings. One implementation provides that text strings are stored with a data item in UTF8 format as required for international character support.

Date attributes store one or more date values. Date value may be represented as an IEEE double format, where the

11

integer part corresponds to the number of days since January 1st 0000 (may be negative) and the fractional part corresponds to the part of a day (that is  $\frac{1}{24}$  is an hour). This allows a wide range of dates to be stored, in a simple format that is universally compatible and compact.

A BLOB attribute corresponds to an array of bytes. A BLOB attribute may not be a database interpretable attribute, but data stored as a BLOB attribute can be interpreted through an application, such as a Word file or image.

Link attributes store one or more references to other items. Link attributes have direction. That is, if item1 is linked to item2, then item2 is also linked to item1 with a backward link of the same name, thus links are always double ended. Links may also have relation types: 1:1, 1:N, M:1, M:N; when N and M>1.

FIG. 2A illustrates how an arrangement of data items may be implemented according to an embodiment of the invention. An arrangement illustrated in FIG. 2A may be used to emulate a hierarchical data arrangement, as shown in FIG. 2B. In the example provided, each data item is a category item or a note item. Each item includes one or more attributes and an identification. In the example shown, each item is shown to have one identification and link attributes, although as explained above, embodiments contemplate an additional GUID identification and multiple attributes of different types (text, integer, date, BLOB).

In FIG. 2A, a first category item **210** includes link attributes **209** and an identification **211** (ID:001). A second category item **216** includes link attributes **215** and an identification **217** (ID:005). A first note item **220** includes link attributes **219** and an identification **221** (ID:003), a second note item **226** includes link attributes **225** and an identification **227** (ID:002), and a third note item **232** includes link attributes **231** and an identification **233** (ID:004). In the example provided, the link attributes **209** of the first category item **210** makes reference to second category item **216**, first note item **220**, second note item **226**, and third note item **232**. Separate types of link attributes may be used when categories make reference to another category (as indicated by asterisk). The separate link attribute indicates that one category is a subcategory of the other category. The link attribute **215** of the second category item **216** makes reference to the first category item **210** and third note item **232**. The link attribute **219** of the first note item **220** makes reference to the first category item **210**, and the link attribute **225** of the second note item **226** makes reference to the first category item **210** and to the third note item **232**.

An embodiment provides that the reference made by each link attribute is bi-directional, so that when one note is referenced by the link attribute of another note, the other note makes reference back with its own link attribute. Thus, for example, the link attribute **219** of the first note item **220** makes reference to the first category item **210**. Likewise, second category item **216** makes reference back to the first category item **210**, and the type of link attribute **215** indicates that the second category item is to be a subcategory of the first category.

An embodiment shown in FIG. 2A illustrates that note items may make reference to one another as well as to category nodes. Specifically, second note item **226** is shown to make reference to third note item **232**. This reference may also be bi-directional, so that the third note item **232** also makes reference to the second note item **226**. The reference between note items may be common in a data store that includes numerous data items. The second note item **226** may be rendered, for example, to show a reference to the third note item **232**, based on a designation of the user. Alternatively, the

12

second note item **226** may be both a category and note item. As mentioned, each data item may be an element of multiple data structures. Likewise, the association between items may be numerous. The manner in which the individual data items may be viewed and used may depend on another layer of the application.

FIG. 2B illustrates a hierarchical structure **250** that can be derived from an arrangement such as shown in FIG. 2A. The hierarchical, structure **250** may, for example, correspond to a directory. A top node **252** of the hierarchical structure **250** may correspond to first category item **210**, which is linked to all other data items. A category node **254** corresponding to the second category item **216** is included in the top node **252**. Nodes in the top node **252**, but not in the category node **254** include nodes **256**, **258** that correspond to first note item **220** and second note item **226** respectively. A node **262** in the category node **254** corresponds to third note item **232**. The link attribute **209** of first category node **210** and third note item **232** may include an additional level of detail that indicates that third note item **232** is an element of a subcategory of the top node **252**. For example, for link attributes between categories, there may be a separate kind of link attribute that indicates the arrangement and nature of a subcategory/category relationship between the two data items. It is also possible for the third note item **232** to be an element of both top node **252** and the category node **254** based on the link attributes illustrated by FIG. 2A.

The formation of hierarchical structure **250** from data items shown in FIG. 2A may be transparent to the user. Thus, an embodiment provides that the user may move nodes in the category to establish new hierarchical relationships, including copying and moving data items, without viewing or having to bother with the link attributes of the individual data items. A move of one node from one location to another may cause one item to alter or add to its link attribute automatically, so that the self-contained data items shown in FIG. 2A include link attributes that reflect the modified hierarchical relationship.

FIG. 3A illustrates how another arrangement of data items for purpose of emulating a database or other relational data structure. In the example provided, each data item is either a table item, a row item, or a cell item. Each item includes one or more attributes and an identification. In the example shown, a first table item **310** includes a link attribute **309** and an identification **311** (ID:001), and a second table item **316** includes a link attribute **315** and an identification **317** (ID:002). Three row items are illustrated: first row item **320** having link attribute **321** and identification **319** (ID:003), second row item **326** having link attribute **325** and identification **327** (ID:004), and third row item **332** having link attribute **331** and identification **333** (ID:005).

In order to emulate databases, it is possible for the row items to carry cell values as separate attributes. Databases may be emulated based on different arrangements of rows that correspond to row items.

As an alternative, separate types of data items may exist for individual cells of the database. In an example provided, three cell items are shown: first cell item **340** having link attribute **339** and identification **341** (ID:006), second cell item **346** having link attribute **345** (ID:007) and identification **347** (ID:007), and third cell item **352** having link attribute **351** and identification **353** (ID:008).

The link attribute **309** of the first table item **310** makes reference to the first row item **320** and the second row item **326**. The link attribute **315** of the second table item **316** makes reference to the second row item **326** and the third row item **332**. The link attribute **319** of the first row item **320** makes



13

reference to the first cell item **340** and second cell item **346**. The link attribute **325** of the second row item **326** makes reference to the third cell item **352**. The link attribute **331** of the third row item **332** makes reference to the second cell item **346**. As mentioned above, each of the references in the link attribute may be bi-directional. Thus, for example, in the case of the link attribute of the first cell item **340**, the link attribute **339** makes reference to the first row item **320** and to the third row item **332**.

FIGS. 3B and 3C illustrate different relational structures that can be formulated from the same set of data items shown in FIG. 3A. In FIG. 3B, a table **360** is shown to include a first row **362** corresponding to the first row item **320**, and a second row **364** corresponding to the second row item **326**. The cells of each row may correspond to the cell items that each corresponding row item references in its respective link attribute. For the first row **362** of the first table **360**, a first cell **361** corresponds to the first cell item **340**, and a second cell **363** corresponds to the second cell item **346**. For the second row **364** of the first table **360**, a cell **365** corresponds to the third cell item **352**.

FIG. 3C illustrates how the independent and self-contained nature of the data items in FIG. 3A enable the use of the same data item for multiple data structures. The second table **370** may be emulated from the data items of FIG. 3A at the same time that first table **360** is emulated. The second table **370** may include a first row **372** that corresponds to the second row item **326**, and a third row **374** that corresponds to the third row item **332**. For the first row **372** of second table **370**, all the cell data items that include a reference in the link attribute to the second row item **326** form the cells. This includes cell **371**, corresponding to third cell item **352**. For the second row **374**, the cell **373** and **375** correspond to first cell item **340** and second cell item **346** respectively.

As with an embodiment described in FIGS. 2A and 2B, manipulation of data items through a layer in which tables **360** and **370** are presented may affect the link attributed of the corresponding data items. For example, the user may execute an operation where data for a third row is to be generated in the second table **370** that corresponds to the first row item **320**. The user may execute a database operation to populate a new row in the second table **370**. On the data item side, the link attribute **319** of the first row item **320** is modified to reference the second table **370**, and the link attribute **315** of the second table item **316** is modified to reference the first row item **320**.

FIGS. 4A and 4B illustrate examples of data items for use with an electronic note management system, such as described with FIG. 1, according to an embodiment. FIG. 4A includes a category data item **410** having a set of named attributes **414** in a left column, and attribute values **418** in a right column. The attribute "O" is a display name attribute having a text string value. The value of this attribute is a display name of the data item. The attribute "CATEGORIES" may include a link value that identifies the UID of one or more other data items that are identified as a category for the data item **410** (backward link). In the example provided, the data item **410** is one item in a main or collection category. The main category may correspond to a top level node in a hierarchical architecture, in that all notes of a particular type (e.g. active notes) must belong to this category. The value of the attribute "CATEGORY" may include one or more links that identify the UID of other notes that link to the particular data item (forward link). Thus, in the example provided, the category data item **410** is a category for notes having UIDs

14

identified in that attribute's value. The "DATE\_CREATED" and "DATE\_MODIFIED" attributes may be of a date data type.

FIG. 4B illustrates an example of a note data item **420**, under an embodiment of the invention. The note data item **420** includes the following named attributes **424**: "ACTIVE\_NOTES", "CONTENT", "HISTORY", "CATEGORY", "DATE\_CREATED" AND "DATE\_MODIFIED". The "ACTIVE\_NOTES" attribute may be a link that identifies the UID of a base category item. This category item may correspond to a top level node for active notes. The "CONTENT" attribute in the example provided includes a text-string value. The value of the "CONTENT" attribute corresponds to the body or content of the electronic note. As such, the "CONTENT" may alternatively be of a BLOB data type, in the case where the "CONTENT" attribute requires a large array of data. This may be the case where the note item is used to display an image, HTML content, or large amounts of text. A "HISTORY" attribute may be a link that identifies the UID of one or more note items that are archive copies of the note. FIG. 6 illustrates a technique for creating a history or archive of individual data items. The data item referenced in the "HISTORY" attribute is link to a copy of a given note that has the content of the original note captured at a given past instance. When an electronic note is manipulated, the notes referenced in the HISTORY attribute locate notes in a previous state. The "CATEGORY", "DATE\_CREATED" AND "DATE\_MODIFIED" may correspond to attributes described with category data item **410**.

FIG. 4C illustrates the category data item **410** and the note data item **420** as rendered on a user-interface **435**. The category data item **410** is rendered as a selectable category field **430** or feature (such as an icon or menu item). When the category field **430** is selected, a set of note items that are associated with that category field **430** are displayed. In the example provided, two notes are shown. The note data item **420** is shown as a displayed note **440**. A content **442** of the displayed note **440** corresponds to the value of the "CONTENT" attribute in the note data item **420**. Likewise, a display name **432** of the category field corresponds to the value of the "O" attribute in the category data item.

FIG. 5 illustrates a data management system for implementing embodiment such as described in this section. In one embodiment, a data management system **510** may include a storage manager **520**, a transaction manager **524**, and a query processor **526**. All of these components may access data items from a data store **530**. The data store **530** may correspond to local hardware where data corresponding to the data items (e.g. category data items and note data items) are stored. The storage manager **520** implements a basic storage scheme to store and retrieve items with their attributes. For efficiency, the storage manager **520** uses memory mapped files, as shown in FIG. 6. Storage manager **520** maintains item indexes that provide item name to address dereferencing in constant time and independent of the number of items in the data store.

The transaction manager **526** implements parallel transaction support for atomic database updates. As part of its operations, the transaction manager **526** may create a transaction log that records operations performed on data items in the data store **510**. This transaction log may be exported to other computers for purpose of performing synchronization operations. A synchronization operation may be carried out by, for example, (i) exporting data items from the data store **510** to another device at an initial time (t=0), and (ii) exporting the transaction log at a later time (t=1) so that another transaction

15

manager implements transactions in the transaction log that were performed on the original data store between  $t=0$  and  $t=1$ .

The query processor **526** implements a language compiler, optimizer and evaluator. In one embodiment, the query processor **526** is Structured Query Language (SQL) based, while in another embodiment, a specialized query language may be used. In one embodiment, the specialized query language is based on the use of predicates, including mathematical and Boolean predicates, for performing comparison operations on the data items.

FIG. 6 illustrates a memory mapping file **602** for use with an embodiment of the invention. The memory mapped file storage for storing data in the data store of FIG. 5, under one embodiment of the invention. The file **602** includes a base header **610**, and a series of frame **620** that each contain from headers **622**. The file **602** may also contain free frames **630**. The base header **610** may carry basic information about the file **602**, such as the GUID for the entire data store, and the next UID available for a newly recorded note. In one embodiment, there may be one frame **620** for each note created by the electronic note system **110**. Data (non-metadata) contained in each frame **620** may correspond to the content body of the corresponding note. In an embodiment, all frames **620** are linked in a doubly-linked list (previous and next). These are physical links to next and previous sequential frames. The frames **620** are used, so they contain data and have a UID that is not zero. The free frames **630**, which are unused, contain no data and have UID=0. All free frames are linked to a circle doubly linked list. In one embodiment, the structure of the file **602** is similar to a Rover Based Heap implementation scheme.

FIG. 7A illustrates a method for archiving or creating a history of data items, under an embodiment of the invention. An embodiment such as shown in FIG. 7 may be used in conjunction with the use of electronic notes, as described in other embodiments of the invention.

In step **710**, a data item is detected as being changed. For example, the user may edit, delete or create content from the content body of the note.

Step **720** provides that the data item is copied into a new note. This copy is a historical version of the note in use. When copied, what happens is that (i) a new note is created and assigned a UID, and (ii) the "CONTENT" attribute (see FIG. 4B) of the historical note is provided the value of the same attribute for the note in use. The note in use may be provided a link attribute to the UID of the historical note. In addition, the historical note may be assigned a category, such as "HISTORY" (see FIG. 4B). To this extent, the historical note may include link attributes that identify the category "HISTORY" and the note in use. Likewise, the note in use may include a link attribute that identifies the historical note's UID.

In step **730**, changes are recorded to the note in use as they happen. According to one embodiment, the changes may alter the "CONTENT" attribute of the note in use, but the changes do not affect the historical note.

FIG. 7B illustrates how historical notes may be created and referenced by notes that are current, under an embodiment. In FIG. 7B, an active note **750** (UID=10) includes a first history note **756** (UID=51), a second history note **762** (UID=123), and a third history note **768** (UID=768). In the example provided, the active note **750** was created on Feb. 1, 2004, and updated on Feb. 2, 2004. At a current date of Mar. 22, 2004, the active note **750** is modified. Each history note carries a creation date. The creation date of first history note **756** is Feb. 1, 2004, and the creation date of second history note **762** is Feb. 2, 2004. On Mar. 22, 2004, when the active note **750** is

16

altered again, the third history note **768** is created having as its creation date Mar. 22, 2004. The electronic note system **110** may be configured to provide any number of history notes, where each history note can be retrieved by the user. For example, if a user does not like edits made to a note, the user can simply open the previous history note for the recently edited note. For this reason, each active note **750** may carry a link attribute that references all of the history notes for that active note. For example, in active note **750**, a link attribute **752** includes reference to the UID of each history note **756**, **762**, **768**. This enables the user to retrieve any of the history notes for the active note **750** when the active note is rendered or otherwise made available. Since link attributes may be bi-directional, each history note may also include a history link attribute **754** back to the active note **750**.

As an example, an embodiment such as shown in FIGS. 7A and 7B may be used in the context of handwriting or speech recognition. A newly created note may carry as its content item handwriting or speech input. Before this note is converted into a text note, the item with the original handwriting/speech input may be copied as a history note. The conversion may occur for the active note, and the active note may link to the history note where the unconverted handwriting/speech input is provided.

Using data items as structured in the aforementioned embodiments for purpose of emulating different data structures and schemas provides several advantages. Among these advantages, data carried in the data store is more portable, and better suited for different platforms, because much less data is needed to perform various operations. In particular, a data store such as described in FIG. 5 may be carried and implemented onto a small device. The data store is also scalable, in that it can better carry large amounts of data. The reduction in data, and the manageability of using link attributes enables aspects of the data management system **510** to be made integral or embedded on systems with relatively limited resources, which compares favorably to the need for stand-alone servers for use with large databases. Additionally, the reduced size of the data store, and the use of link attributes enables a system to operate faster. As a result of this scalability and the efficiency provided by links between items, this system compares favorably with traditional database systems that are normally used by large e-commerce sites.

Numerous applications are possible for using a data management system such as described in the above embodiments. For example, one application includes using the data management system **510** is to provide data for loading and rendering dynamic web pages. The data items stored in the data store **510** may include items carrying content and search criteria, either in the content or through category assignments. When a web page search is performed, an initial match of an item in the data store may rapidly yield additional matches, because the identified item includes links to other items. When a match is made to a category, for example, all data items under that category are instantly identifiable because the category item includes links to all the matching items. Thus, on an e-commerce site, an author search for a novel may locate a category for that author. Then, every item under that category is instantly identifiable because of link attributes in the category item. In contrast, a traditional database approach would require the advance preparation of a huge number of indexes or the real-time scanning of tables and rows to individually locate each matching item to the search criteria.

Categorization

Embodiments of the invention provide for organizing a collection of notes in categories. Categorization provides a

17

mechanism by which users can (i) organize or file notes and (ii) filter what notes are rendered by the UI **118** of the electronic note system **110**. A mechanism by which users can readily assign categories to notes and filter notes by category becomes increasingly useful as the number of notes stored by the electronic note system **110** grows.

FIG. **8A** illustrates a presentation **802** generated under an embodiment of the invention, where multiple panels **810**, **812** may be displayed at the same time. The first panel **810** may display category features **815**, each of which are selectable to cause the electronic note system to display notes belonging in that particular category. The second panel **812** is where the notes **818** are displayed. Both the first panel **810** and second panel **812** may be configured by the user. For example, each panel may be selected to be hidden, made smaller or larger. A side-by-side arrangement facilitates the user in receiving visual cues that can aid the user in locating notes. In particular, the side-by-side arrangement of the panels enables the user to select one of the category features **815**, and then have notes assigned to that category immediately displayed. A visual aid, in the form of a downward arrow, indicates that the particular category feature **815** has been selected, so that the user knows that at least some of the rendered notes in the second panel **812** are from the corresponding category.

Another visual aid to facilitate organizing and locating note is the note count feature **816** provided on each category feature **815**. The note count feature **816** provides a value that corresponds to the number of notes that have been assigned a particular category of the corresponding feature **815**. If a new note is created and assigned to a category, the note count feature will increase by 1.

Embodiments of the invention provide that multiple category assignments to be made to any one single note. For example, a password note containing passwords to financial sites of the user may be categorized under two categories: "Passwords" and "Financial".

FIG. **8B** illustrates an embodiment in which second panel **812** is capable of displaying notes from multiple categories. In FIG. **8B**, features **815** corresponding to categories "Contacts" and "Personal" are selected. In second panel **812**, select notes from each of those categories are rendered at the same time. Moreover, the select notes carry content that is of different data types. For example, contact note **822** from the "Contacts" category includes text data in its content body, while personal note **824** from the "Personal" category includes web-based data in its content body.

In an embodiment, notes may be assigned to categories in one or more of the following ways: (i) automated and by default, (ii) manually by the user and (iii) automated and by user-definition. In an embodiment, the electronic note system **110** includes numerous default categories, and each newly created note is assigned to one of the default categories automatically. In one implementation, the default categories are based on a data type of the content body of the note (e.g. types of text, image, web-based, ink). For example, notes that contain ink content are assigned to a category "Ink", while notes that contain content copied from a website are assigned to a category "Web". Furthermore, this categorization may be automatic, in response to detecting a type of the input. For example, the electronic note system **110** automatically detects "ink" input, and records the input as "ink". Furthermore, the electronic note system **110** may automatically categorize the note as an "Ink Category".

Selection of category features **815** corresponding to those categories will cause the electronic note system **110** to render all notes that were given those automatic assignments. Numerous other properties or characteristics about a note

18

may determine an automatic default categorization of that note. For example, the type of device that created the note may cause the note to be associated with a category that is assigned to that device. To further the example, images provided by a camera device may be stored in a category "Pictures". Furthermore, the user may use templates, and the templates may cause the electronic note system to store a given note in a particular category.

As an additional categorization tool, an embodiment permits a user to manually assign categories to rendered notes. The user may either assign an existing category to a specified note, or create a new category and then assign that note to the newly created category. The act of assigning a category to a note may be accomplished in any one of several ways. FIG. **8C** illustrates a "drag and drop" mechanism in which an active note **832** is in a rendered state in the second panel **812**, and a selected category feature **835** is dragged and dropped onto the active note **832**. The act of dragging and dropping may be accomplished through a pointer device, such as a mouse, electronic pen, touch pad or other mechanism. FIG. **8D** illustrates a selectable category menu **845** that can be called and displayed anywhere on the presentation **802**. In the example provided, it is displayed over regions of both the first panel **810** and the second panel **812**. The category menu **845** includes a list of category features **846**, and a mechanism (such as checkbox **848**) for selecting a particular category feature. When a category feature is selected, the active note **832** is assigned to that category.

In an embodiment, the user may create one or more filtering criteria. If a note is created or modified to include the criteria, the note is automatically categorized in that category. FIG. **8E** illustrates an interface **860** for enabling (i) creation of a new category based on a filtering criteria, and (ii) automatic application of the category to any note that is created or modified to include the particular filter criteria. A category field **862** enables the user to enter a name that is applied to a new category field **815**. A property field **864** and an argument field **866** enable the user to define the category. Table-1 below is an example of menu items that can be included in the property field **864**, and corresponding selections available in the argument field **866**:

TABLE-1

Example property	Example argument
"Are clippings from"	"Website" (or "Email", "Word", etc)
"Have a note type of"	"Ink" (or "HTML" or "Template")
"Were created by"	"Stepan Pachikov"
"Have keyword(s)"	"Spaghetti Italian"
"Are between these dates"	"8/15/03" and "6/15/04"
"Have history notes"	- N/A -
"Include hidden text"	"Portion of note is hidden"
"Are password protected"	"Entire note is hidden"
"Are locked"	- N/A -
"Have no categories assigned"	- N/A -
"Have this category"	"Contacts"
"Have hyperlinks (URLs, etc)"	- N/A -
"Have images"	- N/A -
"Include actions"	- N/A -

In the example provided, the argument field may be typed in by the user and/or selected from a menu list. Once a subsequent note is created or modified to satisfy the criteria of the property field and/or argument field **866**, the note is automatically assigned to the category named in field **862**.

Another technique for creating user-defined categories for automatic categorization is to save search terms. The results of a saved search term may be used to define a category. A category name may also be provided that matches or corre-

sponds to the saved search term. For example, if the user performs a note search (described below) for "Password", the search is conducted using content in the body of individual notes. The search term may be used to name the user-defined category. Subsequently, any note that is created, or modified and which satisfies the search criteria of including "password" in its content body is then automatically assigned to that category. In the example provided, a new category field **815** is created named "Password", and each note that is created/modified to contain the term "password" is automatically assigned to that category.

As described, individual categories may be used to filter a set of notes from the whole. According to one embodiment, it is also possible to filter notes from the whole using two or more categories. FIG. **8F** illustrates use of an intersecting category feature **870**. FIG. **8F** illustrates the case where the user selects the category "Password", using one of the category features **815**. The second panel **812** is used to display individual notes **872** that are in the Password category. In the example shown, the intersecting category feature **870** is provided in a region of the first panel **810**. In the area of the intersecting category feature **870**, additional categories of the notes **872** in the Password category displayed. In the example provided, it is assumed that the Password category contains five notes, and that three of those notes are also categorized under the category of "Financial", and two of those notes are additionally categorized under the category of "Email". Since each note may be assigned to any number of categories, in practice there may be fewer than five notes, as one note can be in both "Financial" and "Email".

What the intersecting category feature **870** allows is for the user to use filtering to quickly locate and view a small set of notes. For example, the user may need his online banking password. The user may know that the password is contained in the category Password, but it may not be readily apparent to him that the password may also be stored under the category of Financial. When the user filters all of the notes with the Password category, the user is presented with not just notes in that category, but a list of all additional categories that the notes in the Password category belong to. He sees the "Password" Category has three notes, so he can assume that there are three notes that carry passwords for financial accounts/resources. He then can make a sub-selection of the "Financial" category on the assumption that the password for his online banking account will be categorized under both "Password" and "Financial".

The use of the intersecting category feature **870** may be progressive past two selections of intersecting categories. In one embodiment, there may be a first category ("A") selection from the first panel **810**, then a second category ("B") selection from the intersecting category feature **870**, which yields in second panel **812** a set of notes that are in both category "A" and category "B". At this point, the intersecting category feature **870** may display additional categories, for notes that are in A, B and a third or more category. Selection of a third category from the intersecting category feature **870** may yield in the second panel **812** the set of notes that are in A, B and C. In this way, when there are many notes in a particular category, the intersecting category feature **870** enables the user to quickly locate a desired note using a progressively narrowing set of intersecting categories.

#### Note Search

In addition to category filtering, embodiments of the invention may provide a search tool to quickly locate a desired note that contains in its content body a specific characteristic that is specified by the search criteria. In an embodiment, the search criteria specifies a string of characters, such as a key-

word, so that all notes that contain the particular keyword are returned as the search result. Other examples of a search criteria include a data type of a note's content body, and a date or date range corresponding to when a note was created or modified.

To facilitate rapid searching and identification of notes, an embodiment such as described in FIG. **9** employs a smart search feature for character string search criteria. For each character **902** that a user enters in a search field **904**, a result, or an indication of a result is returned instantly. In one embodiment, what is returned is an indication of a result in the form of an integer. This is termed the return integer **906**. The return integer **906** corresponds to how many notes in a set have in their content body the portion of the string entered up to that point.

In the example provided, the user's search string is PASSWORD. When the user enters P, the return integer **906** is 50. When the user enters A, the return is 46. The return integer value decreases with subsequent character entries. However, as shown by the example, a point may be reached before the user has completed the string in which no reduction in the return integer is achieved with the addition of character strings to the search term. In the example provided, the integer value's minimum is reached with PASSW. At this point, there is no additional benefit in the user completing the search string.

#### Endless Tape Presentation of Notes

Embodiments of the invention provide for a presentation in which notes are arranged in a rendered state to be seamless and sequential. Referring back to FIGS. **8A** and **8B**, notes are in an open state, so that their content bodies are viewable on the second panel **812**. Moreover, when notes are open, they appear end-to-end, so that a viewer can scroll from one open note to another. As the user scrolls further, additional notes that may not have been displayed at the start are progressively presented. The feel the person is provided is that the notes are sequenced, and continuously arranged. In one embodiment, the presentation **802** is formed in which notes are presented as an endless roll of paper. Each newly created note is, as a default, tacked on to the bottom of the stack.

The endless tape presentation may be best viewable by the user when the user selects the "ALL NOTES" feature **855**. This feature removes all filtering from the presentation of notes in the second panel **812**. All notes are then presented in a sequence, end-to-end, in a scrollable or navigatable manner. This allows the user to scroll and read notes, and since the notes are in a rendered state, the user does not have to open and close individual notes. The sequencing of the note provides the user with a sense of order in viewing the notes, so that the user can better locate a note or determine the context of a note while scrolling.

#### Time Band

Another feature that facilitates the user in locating individual notes is a time band feature **880**. The time band feature **880** may display date, time and/or calendar information adjacent to the tape presentation of the notes. The time band feature **880** facilitates the user in locating a spot in the tape of notes where a particular note may be found. For example, the user may know that he created a new note to store a password in the month of March. In one embodiment, the time band feature **880** is implemented as a continuous bar from which the user may select points or regions using, for example, a pointer or mouse-click. When the region or point of the time band is selected, the presentation shifts to display notes that were either modified or created in the time range specified by

the user's selection. Thus, in the example provided, the user may browse all notes created in March using the time band **880**.

An embodiment provides that the time band feature **880** is calendar based, meaning it lists days, months or weeks. Furthermore, the time band feature **880** may extend lengthwise in a direction of the tape presentation. It can run alongside of the second panel **812**, so that the user can view date/time information of notes that appear in the panel **812** at any given instant.

#### Activity Marker

In addition to time band **880**, FIGS. **8A** and **8B** illustrates an activity marker **890** that indicates the amount of note activity at a particular point in the tape. Together, with the time band **880**, the activity marker **890** indicates the amount of note activity at a particular time, date or date range. Note activity can include note creation and/or modification. In an embodiment, the note activity may also correspond to the amount of time that the user worked on a note. In one embodiment, the activity marker **890** is presented as a histogram, where a histogram value corresponds to the amount of note activity.

#### Activity and Time Band Configurations

The time band feature **880** and the activity band **890** each provide a mechanism by which user's can browse and locate notes, using visually presented date/time and calendar feature. FIGS. **10A** and **10B** each illustrate a configuration panel **1010** for configuring the time band **880** and the activity band **890**. The configuration panel **1010** may be configured by specifying a date range using fields **1012** and **1014**. As shown by FIG. **10B**, these fields may be used to open a calendar **1022** for selecting either the beginning date or ending date of a date range. The date range may specify the top and bottom of the time band **880**, and/or the notes that are to appear in the presentation **802** for the given time period. A checkbox feature **1016** may be used for the user to select the activity band **890** to appear. Another checkbox feature **1018** may be used for the user to select dates to appear in the time band **880**. A third checkbox feature **1020** may be used to show ticks in the time band **880**.

#### Accelerator

As a scroll or navigation feature, embodiments may employ a variable speed scroll feature. Referring to FIGS. **8A** and **8B**, a variable speed scroll bar **895** is provided adjacent to the time band **880** and the activity marker **890**. The variable scroll bar **895** can be moved lengthwise or longitudinally, in order to effectuate the notes in the panel **812** to scroll at a speed and direction that depends on the position of the bar **895** is relation to a reference **896**. In one embodiment, the reference is a centerline of the scroll bar and/or panel **812**. The farther a marker of the scroll bar **895** is from the centerline, the faster the scrolling function is performed to propagate notes through the panel **812** in the directions specified by the scroll bar. Thus, for example, if the scroll bar is moved several inches from the center line, the scroll speed of the notes in the second panel **812** is fast. Conversely, if the scroll bar is moved near the centerline, the scroll speed is slow.

In addition to varying speed in relation to the position of the scroll bar, an embodiment provides that the scroll speed of the notes in the panel **812** may accelerate, particularly when the scroll bar **895** is moved farther away from the centerline. Thus, for example, when the user knows he needs to move from the end of the tape to its beginning, the user can move the scroll bar **895** far from the centerline and effectuate an increasingly faster scroll speed until the beginning is reached. Such a function enables scrolling through notes rendered in an end-to-end fashion to be performed very rapidly.

#### Additional Features

Embodiments of the invention permit users to assign colors to individual notes. The assignment of colors may be automated, similar in manner to how notes may be automatically categorized. Thus, the user may configure the electronic note system **110** to assign a color for a particular category or data type or other distinguishing characteristic of the note.

Since notes may contain confidential information, a user may be able to individually password protect notes. Notes may be password protected individually, even if other notes in a similar category are not password protected. Furthermore, it is possible for only a portion of the overall content provided by a note to be encrypted or locked. For example, the user may make the introduction portion of a text in the content body unprotected, so he can see what is in the note when he is subsequently browsing the notes. But sensitive information in the same note may be blocked from view and password accessible.

#### Alternative Embodiments

While embodiments described herein incorporate user-interface features and functionality with a system that manages electronic notes, it should be apparent that many user-interface features and methodologies may be implemented with other file and record management systems, or just simply in other contexts. That is, many features (such as the accelerator bar or the histogram) may be used in other applications and file systems.

According to an embodiment, the electronic note system **110** is capable of interfacing with devices and sources from which media content may be provided. In one embodiment, when the electronic note system **110** is interfaced with a media source, the electronic note system takes some action to capture media in the content body of a note. The electronic note system **110** may also take some action to categorize or arrange the note in relation to other notes. In one embodiment, the electronic note system **110** may be used to receive images from a digital camera. The image may be captured and copied onto the content body of the note, either automatically or manually by the user. Once captured, the note may be arranged. For example, the image may be placed at the "end of the tape" as a new note. As an additional or alternative, the note may be categorized based on, for example, the type of device (e.g. digital camera) or the source that provides the image, or based on the type of data that is received (rich image data).

#### Conclusion

Although illustrative embodiments of the invention have been described in detail herein with reference to the accompanying drawings, it is to be understood that the invention is not limited to those precise embodiments. As such, many modifications and variations will be apparent to practitioners skilled in this art. Accordingly, it is intended that the scope of the invention be defined by the following claims and their equivalents. Furthermore, it is contemplated that a particular feature described either individually or as part of an embodiment can be combined with other individually described features, or parts of other embodiments, even if the other features and embodiments make no mention of the particular feature. This, the absence of describing combinations should not preclude the inventor from claiming rights to such combinations.

#### What is claimed is:

1. A method of managing electronic notes, comprising:
  - storing visual data for at least one of the electronic notes;
  - presenting information corresponding to the visual data for the at least one of the electronic notes using a first user

## 23

interface, wherein the first user interface facilitates entry and modification by a user of the visual data for the electronic notes; and

defining an action for the at least one of the electronic notes using a second user interface different from the first user interface, wherein the action is implemented by a method that automatically performs the action for the at least one of the electronic notes and wherein the action is selected from the group consisting of: automatically deleting the at least one of the electronic notes after a predetermined amount of time has passed, providing an alarm after a predetermined amount of time has passed, receiving content that is copied to the at least one of the electronic notes, and password-protecting the at least one of the electronic notes after a pre-determined amount of time has lapsed.

2. A method, according to claim 1, wherein the action corresponds to a script provided by a user.

3. A method, according to claim 2, wherein the script is provided by one of: a wizard and a programmatic assistant that facilitates creating and defining scripts for performing automated actions using specified notes.

4. A method, according to claim 1, wherein a user provides timing information indicating when the action is to be performed using the at least one of the electronic notes.

5. A method, according to claim 4, wherein the timing information is provided by a wizard.

6. A method, according to claim 5, wherein the timing information is provided by the user via the second user interface.

7. Computer software, provided in a non-transitory computer readable medium, that manages electronic notes, the software comprising:

executable code that stores visual data for at least one of the electronic notes;

## 24

executable code that presents information corresponding to the visual data for the at least one of the electronic notes using a first user interface, wherein the first user interface facilitates entry and modification by a user of the visual data for the electronic notes; and

executable code that facilitates defining an action for the at least one of the electronic notes using a second user interface different from the first user interface, wherein the action is implemented by a method that automatically performs the action for the at least one of the electronic notes and wherein the action is selected from the group consisting of: automatically deleting the at least one of the electronic notes after a predetermined amount of time has passed, providing an alarm after a predetermined amount of time has passed, receiving content that is copied to the at least one of the electronic notes, and password-protecting the at least one of the electronic notes after a pre-determined amount of time has lapsed.

8. Computer software, according to claim 7, wherein the action corresponds to a script provided by a user.

9. Computer software, according to claim 8, wherein the script is provided by one of: a wizard and a programmatic assistant that facilitates creating and defining scripts for performing automated actions using specified notes.

10. Computer software, according to claim 7, wherein a user provides timing information indicating when the action is to be performed using the at least one of the electronic notes.

11. Computer software, according to claim 10, wherein the timing information is provided by a wizard.

12. Computer software, according to claim 11, wherein the timing information is provided by the user via the second user interface.

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